Polyostotic rib fibrous dysplasia resected by video-assisted thoracoscopic surgery with preservation of the overlying periosteum

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Video-assisted thoracoscopic rib resection has rarely been reported, but a relatively simple procedure that uses readily available instruments can prove to be feasible.[1-3] A conventional approach would involve an incision greater than the length of the mass itself. Such an approach would require significant resection of the chest wall musculature and could lead to significant postoperative morbidity and decrease in quality of life. Multiple rib tumors would require an even more extensive incision and may require multiple incisions to facilitate exposure and removal. We report the removal of 2 expansile bone tumors by video-assisted thoracoscopic surgery while preserving the periosteum to allow for bone formation. To the best of our knowledge, no such attempts at preserving the periosteum during a rib resection via video-assisted thoracoscopy have been done.

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CLINICAL SUMMARY

An 18-year-old male patient with Down syndrome was admitted to the urology department of Hanyang University Guri Hospital with a testicular artery rupture after a bicycle accident. The patient underwent an emergency operation for the bleeding. After a thorough inquiry, the patient reported having chest pain over his left chest wall for 3 months. The patient did not have precocious puberty or café-au-lait spots. A routine chest x-ray showed cortical thickening in the patient's ribs. Computed tomography scans of his chest showed multiple bone tumors of the fourth, sixth, seventh, and eighth ribs (Figure 1). The sixth and seventh ribs were expansile; thus, for diagnostic reasons and to rule out possible malignancy, he was referred to the general thoracic department and an operation by minimally invasive surgery was scheduled.

General anesthesia was done with double-lumen ventilation, and the patient was placed in the right down 30-degree semilateral position with his right arm tucked beside the pillow. Three ports were used: a 3-mm port at the third intercostal space, a 15-mm port at the areola margin, and a 5-mm

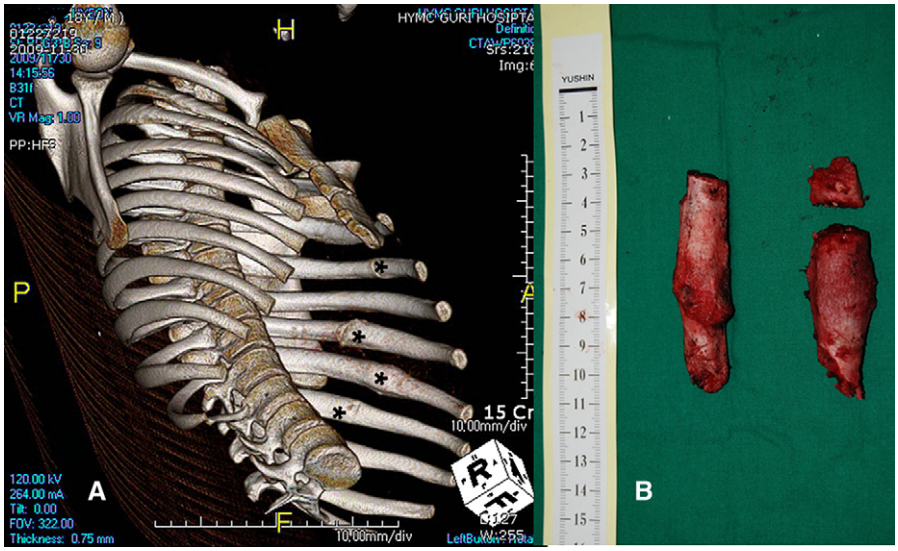

FIGURE 1. Three-dimensional image on computed tomography scan of the multiple bone tumors indicated by *asterisks* (A) and the actual resected sixth and seventh ribs (B).

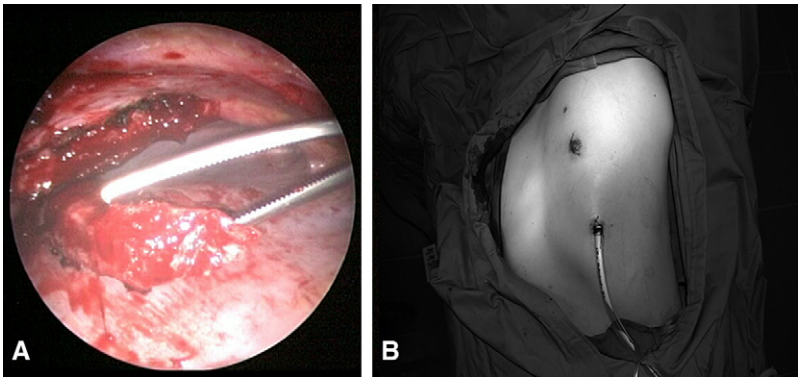

FIGURE 2. A, Intraoperative picture of the resected seventh rib showing the seventh rib bed and portions of the sixth rib bed with preserved overlying periosteum. B, Placement of the ports and drain taken immediately after the procedure.

port at the seventh intercostal space medial to the areola. Carbon dioxide insufflation was used as needed. A 3-mm camera and hook cautery were used to demarcate a 1-cm ample margin on both sides of the expansile bone tumor. A Freer periosteal elevator (Aesculap, Tuttlingen, Germany) was used to spare the periosteum. Rib cutting was done with a Kerrison bone punch (Aesculap), as mentioned in our earlier report.[3] To separate the rib from the periosteum anteriorly, a right angle was used and bone was removed with a 10-mm claw forceps via the 15-mm port at the areola margin. The same method was done with both sixth and seventh ribs (Figure 2).

The procedure took approximately 120 minutes for the removal of both ribs. The patient's chest tube was removed on the postoperative fourth day, and he was discharged the following day. His postoperative course was uneventful, and histologic examination revealed polyostotic fibrous dysplasia. At 3 months postoperatively, the patient was pleased with the cosmesis and had no symptoms of chest pain.

DISCUSSION

Fibrous dysplasias are benign tumors that affect the ribs in 50% of cases, 70% are solitary and 25% can be polyostotic.[4] In 5% of cases, they may be associated with café-au-lait spots and precocious puberty, known as McCune–Albright syndrome.[4] Although the tumors are generally benign, malignant transformation has been reported from 0.4% to 4%.[5] Our particular case presented 4 bone lesions, 2 of which were expansile. The patient was symptomatic, and the operation was performed for definite diagnosis and treatment.

There have been other reports of rib resection with the aid of thoracoscopy,[1-3] but none have mentioned preservation of the overlying periosteum. In our previous reported case of a xanthoma, resection by video-assisted thoracoscopic surgery did not include sparing of the periosteum.[3] We have had a few cases of rib resection with preservation of the overlying periosteum leading to regrowth of the rib proven radiographically, as shown in one such case with regrowth of the sixth rib 5 years after the resection in a 20-year-old male patient (Figure 3). Sacrificing periosteum would theoretically make regrowth of normal bone tissue difficult, and in this particular case may lead to an eventual flail chest should a second procedure be needed. We used readily available equipment, the Kerrison bone punch and Freer periosteal elevator.

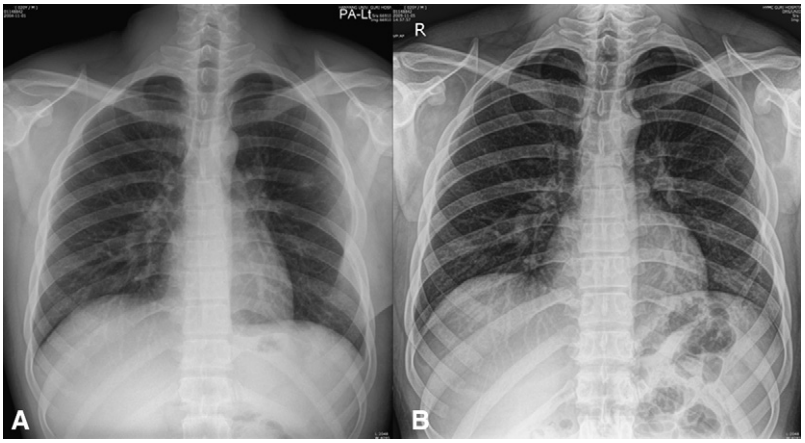

FIGURE 3. A 20-year-old male patient with fibrous dysplasia who underwent resection of his sixth rib (A) with preservation of the overlying periosteum. Regrowth of bone in the rib bed is shown in a chest x-ray taken 5 years after the operation (B).

CONCLUSIONS

Partial resection of more than 2 ribs performed in any possible way cannot cosmetically compare with a thoracoscopic procedure, pulling the multiple resected ribs through a small 15-mm incision. No muscle damage occurs in this minimally invasive procedure. This procedure can be applied to any benign lesion or tumor of the ribs. We believe such a procedure reduces the pain, scarring, and morbidity associated with an open procedure and allows for bone regrowth, which would negate any advantages the open procedure may have over the thoracoscopic minimally invasive procedure.

References

1. Nakagiri T, Akashi A, Shigemura N. Thoracoscopic rib resection using a Gigli saw. *Ann Thorac Surg*. 2005;80:755-6.
2. Ohtsuka T, Wolf RK, Dunsker SB. Port-access first-rib resection. *Surg Endosc*. 1999;13:940-2.
3. Chon SH, Lee CB, Shinn SH, Heo JN, Paik SS. Rib xanthoma resected by video-assisted thoracoscopic surgery using a bone punch. *Surg Laparosc Endosc. Percutan Tech*. 2009;19:e15-6.
4. O'Conner B, Collins FJ. The management of chest wall resection in a patient with polyostotic fibrous dysplasia and respiratory failure. *J Cardiothorac Vasc Anesth*. 2009;23:518-21.
5. DiCaprio MR, Enneking WF. Fibrous dysplasia. Pathophysiology, evaluation, and treatment. *J Bone Joint Surg Am*. 2005;87:1848-64.